**mactec-ers**
MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

**Borehole**  # 21-11-03

**Log Event** A

## Borehole Information

| | | |
|---|---|---|
| **Farm :**  BX | **Tank :**  BX-111 | **Site Number :**  299-E33-237 |
| **N-Coord :**  45,500 | **W-Coord :**  53,502 | **TOC Elevation :**  655.50 |
| **Water Level, ft :** | **Date Drilled :**  10/31/1973 | |

**Casing Record**

| | | |
|---|---|---|
| Type :  Steel-welded | Thickness, in. :  0.280 | ID, in. :  6 |
| Top Depth, ft. :  0 | Bottom Depth, ft. :  100 | |

**Borehole Notes:**

Borehole 21-11-03 was drilled in October 1973 to a depth of 100 ft with 6-in. casing.  The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing.  A driller's log was not available for this borehole, so data from Chamness and Merz (1993) were used to provide borehole construction information.  No information was available to indicate that the casing was perforated or grouted. The top of the casing, which is the zero reference for the SGLS, is about 0.5 ft below the ground surface.

## Equipment Information

| | | |
|---|---|---|
| **Logging System :**  1B | **Detector Type :**  HPGe | **Detector Efficiency:**  35.0 % |
| **Calibration Date :**  02/1997 | **Calibration Reference :**  GJO-HAN-13 | **Logging Procedure :**  P-GJPO-1783 |

## Log Run Information

| | | |
|---|---|---|
| **Log Run Number :**  1 | **Log Run Date :**  07/29/1997 | **Logging  Engineer:**  Alan Pearson |
| **Start Depth, ft.:**  0.0 | **Counting Time, sec.:**  100 | **L/R :** L        **Shield :** N |
| **Finish Depth, ft. :**  40.5 | **MSA Interval, ft. :**  0.5 | **Log Speed, ft/min.:**  n/a |

| | | |
|---|---|---|
| **Log Run Number :**  2 | **Log Run Date :**  07/29/1997 | **Logging  Engineer:**  Alan Pearson |
| **Start Depth, ft.:**  39.5 | **Counting Time, sec.:**  100 | **L/R :** R        **Shield :** N |
| **Finish Depth, ft. :**  44.5 | **MSA Interval, ft. :**  0.5 | **Log Speed, ft/min.:**  n/a |

| | | |
|---|---|---|
| **Log Run Number :**  3 | **Log Run Date :**  07/29/1997 | **Logging  Engineer:**  Alan Pearson |
| **Start Depth, ft.:**  43.5 | **Counting Time, sec.:**  100 | **L/R :** L        **Shield :** N |
| **Finish Depth, ft. :**  65.0 | **MSA Interval, ft. :**  0.5 | **Log Speed, ft/min.:**  n/a |

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Log Event  A

**Borehole**  21-11-03

| | | |
|---|---|---|
| **Log Run Number :**    4 | **Log Run Date :**    07/30/1997 | **Logging  Engineer:**    Alan Pearson |
| **Start Depth, ft.:**    64.0 | **Counting Time, sec.:**    100 | **L/R : L**        **Shield : N** |
| **Finish Depth, ft. :**    98.5 | **MSA Interval, ft. :**    0.5 | **Log Speed, ft/min.:**    n/a |

## Analysis Information

Analyst :    D.L. Parker

Data Processing Reference :    MAC-VZCP 1.7.9          Analysis Date :    12/10/1997

**Analysis Notes :**

All of the pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications.  The energy calibration and peak-shape calibration were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

**Log Plot Notes:**

Separate log plots show the man-made and the naturally occurring radionuclides.  The natural radionuclides can be used for lithology interpretations.  The headings of the plots identify the specific gamma rays used to calculate the concentrations.  Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals.  Open circles on the plots give the MDL.  The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log.  The gross gamma plot displays the latest available digital data.  No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A plot of the spectrum shape factors is included.  The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

A plot of selected historical gross gamma logs from 1980 to 1989 is also included.  The plot can be used to help identify any historical changes in gross gamma activity.